MACHINE SR_M1
REFINES SR_M0
SEES SR1_Block
VARIABLES
  Route_Req
  Route_Cel
  Route_Occ
  Route2Path
  Block2Route
  Route2OccPath
INVARIANTS
  inv1: $Block2Route \in BLOCK \nrightarrow ROUTE$
    reserve
  inv2: $Route2OccPath \in ROUTE \nrightarrow PATH$
  inv3: $\forall p \cdot p \in PATH \Rightarrow (\forall q \cdot q \notin PathConflict[\{p\}] \Leftrightarrow (Path2Block[\{p\}] \cap Path2Block[\{q\}] = \varnothing))$
EVENTS
Initialisation ⟨extended⟩
  begin
    act1: $Route\_Req := \varnothing$
    act2: $Route\_Cel := \varnothing$
    act3: $Route\_Occ := \varnothing$
    act4: $Route2Path := \varnothing$
    act5: $Block2Route := \varnothing$
    act6: $Route2OccPath := \varnothing$
  end
Event ATS_Request ⟨ordinary⟩ $\widehat{=}$
extends ATS_Request
  any
    r
  where
    grd1: $r \notin Route\_Req$
  then
    act1: $Route\_Req := Route\_Req \cup \{r\}$
  end
Event Block_Reserve ⟨ordinary⟩ $\widehat{=}$
  any
    r
    p
  where
    grd1: $r \in Route\_Req$
    grd2: $r \notin Route\_Cel$
    grd3: $r \notin dom(Route2Path)$
    grd4: $p \in PATH$
    grd5: $p = Route2InitPath(r)$
    grd6: $Path2Block[\{p\}] \cap dom(Block2Route) = \varnothing$
  then
    act1: $Block2Route := Block2Route \cup (Path2Block[\{p\}] \times \{r\})$
  end
Event Route_Reserve ⟨ordinary⟩ $\widehat{=}$
extends Route_Reserve
  any
    r
  where
    grd1: $r \in Route\_Req$
    grd2: $r \notin Route\_Cel$
    grd3: $r \notin dom(Route2Path)$

$\qquad$ grd4: $PathConflict[Route2InitPath[\{r\}]] \cap ran(Route2Path) = \varnothing$

$\qquad$ grd5: $Block2Route^{-1}[\{r\}] = Path2Block[\{Route2InitPath(r)\}]$

then

$\qquad$ act1: $Route2Path := Route2Path \cup \{r \mapsto Route2InitPath(r)\}$

end

Event Train_Enter $\langle ordinary \rangle \;\widehat{=}$

extends Train_Enter

$\quad$ **any**

$\qquad$ r

$\quad$ **where**

$\qquad$ grd1: $r \in dom(Route2Path)$

$\qquad$ grd2: $r \notin Route\_Occ$

$\qquad$ grd3: $r \notin dom(Route2OccPath)$

$\quad$ **then**

$\qquad$ act1: $Route\_Occ := Route\_Occ \cup \{r\}$

$\qquad$ act2: $Route2OccPath := Route2OccPath \cup \{r \mapsto NullPath\}$

$\quad$ **end**

Event Train_Head_Move $\langle ordinary \rangle \;\widehat{=}$

$\quad$ **any**

$\qquad$ r

$\qquad$ op

$\qquad$ b

$\quad$ **where**

$\qquad$ grd1: $r \in Route\_Occ$

$\qquad$ grd2: $r \in dom(Route2Path)$

$\qquad$ grd4: $b \in Path2Block[\{Route2Path(r)\}]$

$\qquad$ grd5: $r \in dom(Route2OccPath)$

$\qquad$ grd6: $op = Route2OccPath(r)$

$\qquad$ grd7: $b \notin Path2Block[\{op\}]$

$\quad$ **then**

$\qquad$ act1: $Route2OccPath(r) := PathIncrease(op)(b)$

$\quad$ **end**

Event Train_Rear_Move $\langle ordinary \rangle \;\widehat{=}$

$\quad$ **any**

$\qquad$ r

$\qquad$ op

$\qquad$ b

$\qquad$ p

$\quad$ **where**

$\qquad$ grd1: $r \in Route\_Occ$

$\qquad$ grd2: $r \in dom(Route2OccPath)$

$\qquad$ grd3: $op = Route2OccPath(r)$

$\qquad$ grd6: $p = Route2Path(r)$

$\qquad$ grd4: $b \in Path2Block[\{op\}] \cap Path2Block[\{p\}]$

$\qquad$ grd5: $op \neq NullPath$

$\qquad$ grd7: $p \neq NullPath$

$\quad$ **then**

$\qquad$ act1: $Route2OccPath(r) := PathReduce(op)(b)$

$\qquad$ act2: $Route2Path(r) := PathReduce(p)(b)$

$\quad$ **end**

Event Block_Release $\langle ordinary \rangle \;\widehat{=}$

$\quad$ **any**

$\qquad$ b

$\qquad$ r

$\quad$ **where**

$\qquad$ grd1: $r \in Route\_Occ$

$\qquad$ grd2: $b \in Block2Route^{-1}[\{r\}]$

$\qquad$ grd3: $b \notin Path2Block[\{Route2OccPath(r)\}]$

        grd4: ⟨theorem⟩ $b \notin Path2Block[\{Route2Path(r)\}]$

    then

        act1: $Block2Route := \{b\} \lhd Block2Route$

    end

Event Train_Leave ⟨ordinary⟩ $\widehat{=}$

extends Train_Leave

    any

        r

    where

        grd1: $r \in Route\_Occ$

        grd2: $r \in dom(Route2Path)$

        grd3: $Route2Path(r) = NullPath$

        grd4: $Block2Route^{-1}[\{r\}] = \varnothing$

    then

        act1: $Route\_Occ := Route\_Occ \setminus \{r\}$

        act2: $Route2OccPath := \{r\} \lhd Route2OccPath$

    end

Event Route_Release ⟨ordinary⟩ $\widehat{=}$

extends Route_Release

    any

        r

    where

        grd1: $r \in dom(Route2Path)$

        grd2: $Route2Path(r) = NullPath$

        grd3: $r \notin Route\_Occ$

        grd4: $Block2Route^{-1}[\{r\}] = \varnothing$

        grd5: $r \notin dom(Route2OccPath)$

    then

        act1: $Route2Path := \{r\} \lhd Route2Path$

        act2: $Route\_Req := Route\_Req \setminus \{r\}$

    end

Event ATS_Cancel ⟨ordinary⟩ $\widehat{=}$

extends ATS_Cancel

    any

        r

    where

        grd1: $r \in Route\_Req$

    then

        act1: $Route\_Cel := Route\_Cel \cup \{r\}$

    end

Event Block_Cancel ⟨ordinary⟩ $\widehat{=}$

    any

        r

    where

        grd1: $r \in Route\_Cel$

        grd2: $r \in ran(Block2Route)$

        grd3: $Path2Block[\{Route2Path(r)\}] \cap dom(Block2Route) = \varnothing$

    then

        act1: $Block2Route := Block2Route \rhd \{r\}$

    end

Event Route_Cancel ⟨ordinary⟩ $\widehat{=}$

extends Route_Cancel

    any

        r

    where

        grd1: $r \in Route\_Req$

        grd2: $r \in Route\_Cel$

        grd3: $r \notin Route\_Occ$

        grd4: $r \in dom(Route2Path)$
        grd5: $Block2Route^{-1}[\{r\}] = \varnothing$

then

        act1: $Route\_Req := Route\_Req \setminus \{r\}$
        act2: $Route\_Cel := Route\_Cel \setminus \{r\}$
        act3: $Route2Path := \{r\} \lhd Route2Path$

end

END